# stuart®

Recirculating Coolers
SRC4 SRC14
Instructions for use
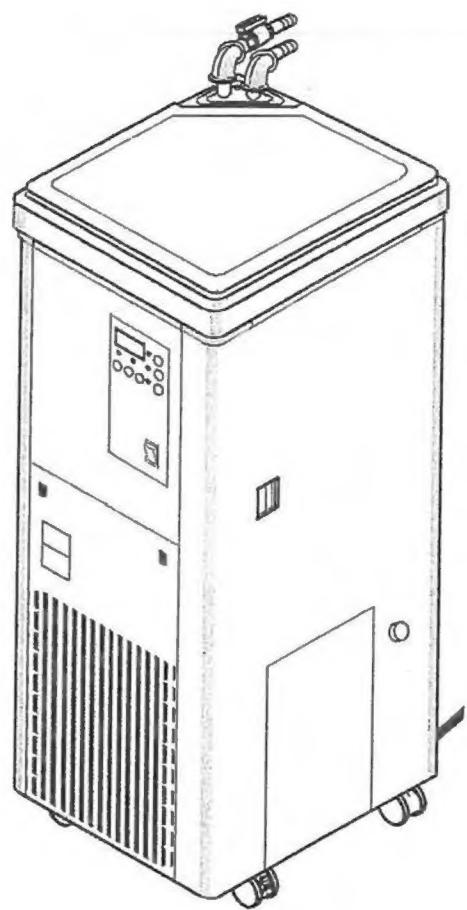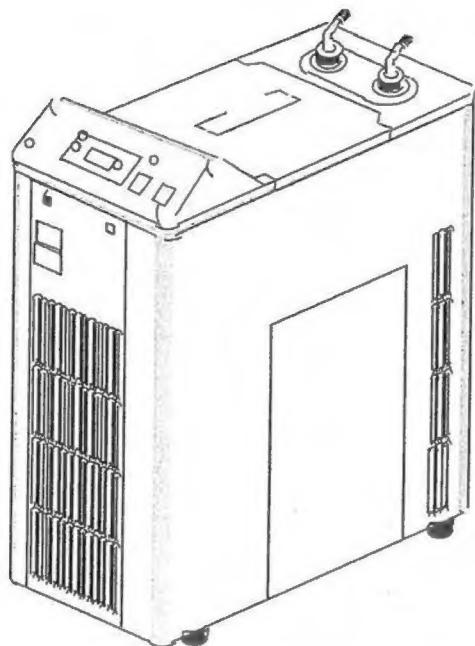
Congratulations on your purchase

Introduction

This manual describes the procedure of installation, operation, troubleshooting, maintenance, check-up and disposal of Low Temperature Circulator,

Table of contents

Items contained in your carton

Check the type and quantity of items before setting up.

No.	Name	QTY
1	Main unit	1
2	Instruction Manual	1
3	Slow blow fuse 6.3A (Spare part)	2
4	Power cord (applicable in European countries)	1

2 | Outline of the product

2-1 Application

⚠ Warning
Do not remodel the product. Do not use it out of specified application.
Remodeling or inappropriate use of the Product may cause electric shock or malfunction.

This is a low temperature circulator that cools down the solvent in the bath by refrigeration unit and circulates externally through circulation pump and cools it off the heating portion of evaporator(1L), reaction bath and various devices.

2-2 Specification

			Product name	Low temperature circulator
			Model	
			Circulation system	Circulation toward sealed system
F E A T U R E S			Range of temperature control ※1	-20～30℃
			Accuracy of temperature control ※2	±1℃(Setting 20～10℃) ±1.5℃(Setting -11～-20℃)
	Cooling capability ※3	Liquid temp.	at 10℃	450W
			at 0℃	400W
			at -10℃	310W
	Circulation capability ※4		Max. Lifting height	4.2±0.5m(50Hz)
			Max. Flow volume	9L/min(50Hz)
F U N C T I O N S	Temperature control system			Refrigeration unit ON-OFF control
	Temperature setting・display			Sheet key digital setting Digital display for measured and setting temperature (Resolution:1℃)
	Ancillary functions			・User adjustment mode (calibrating displayed temperature, power recovery setting)
	Safety features			・Residual current device, excess current breaker ・Over load relay for refrigeration unit ・Protection timer for refrigeration unit ・Self-diagnosis functions(abnormal status of refrigeration unit, power failure alarm, sensor alarm, watch dog) ・Impedance protection for circulation pump
	Optional functions			・Stop valve for flow volume, ・insulation hose set, ・stainless lid, ・Pt screw port, ・Carriage, ・Clamp for fixing the product
C O M P O N E N T S	Temperature controller			Electrical digital display・digital display
	Temperature sensor			Thermister
	Refrigeration unit・refrigerant			Air-cooled type, 450W、HFC R-404A
	Bath			・Whole capacity: Approx.4L ・Actual capacity:Apprx.3L ・Material: SUS304
	Cooling coil			Copper (Nickel plate)
	Diameter of circulation nozzle			11mm (External diameter)×7mm(bore diameter)

2-2   Specification

Product name		Low temperature circulator
Model		
S P E C.	Dimension of bath	156W × 225D × 115H (mm)
	Range of ambient temperature	5~40℃ (Indoor use only) ※5
	External dimension (W × D × H) ※6	232W × 497D × 490H (mm)
	Weight	Approx. 30kg
	Supply power, voltage	4A , 0.8KVA
	Rated supply ※7	AC220V ±10% 50Hz
	Operation presser max.	2.33Mpa
	Pollution degree	2
	Over voltage category	II
	Operation at a terrestrial altitude	Max2000m above sea level

※1   Heater is not equipped.
　　· Temperature control not available when the ambient temperature is low, unloaded and high
　　　temperature setting.

※2   Condition
　　· Room temperature：20℃　· Circulation volume：Max.　· No Load　· Supply power and
　　　voltage：AC220V　50Hz
　　　※Ambient temperature is 20℃ and unloaded, temperature setting at 30℃ is not available.
　　· Accuracy of temperature control doffers depending on circulation volume of liquid, type of
　　　refrigerant, heat load and room temperature and other use conditions.
　　· Displayed temperature may be higher than actual temperature depending on display accuracy of
　　　temperature controller.
　　　Accuracy of temperature control is not the value that is displayed on temperature controller.

※3   Condition
　　· Room temperature：20℃ · Circulation volume：Max. · Supply power and voltage：AC220V　50Hz
　　· Cooling capability is ±10% of displayed capability.
　　· Cooling capability differs depending on room temperature, supply power, voltage, type of
　　　refrigerant and stirring condition in the bath.

※4   Condition
　　· Room temperature：20℃　· Supply power, voltage：AC220V　50Hz
　　· Cooling capability is ±10% of displayed capability.
　　· Circulation capability differs depending on use conditions (type of the liquid, room temperature
　　　and etc.).

※5   In order to guarantee the performance of the instrument described in this manual
　　ambient temperature must be within the range from 5 to 35℃.

※6   External dimension does not include protrusion.

※7   When voltage is dipped during operation, the unit may indicate "OVL" or "Poff" may be on the
　　control panel and then quit operation. However, this is not a fault of the unit.

2-5 Options

1. Stop valve

No.	Product name	QTY	Catalog No
1	Stop valve	1	182460
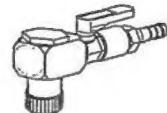
2. Pt Screw port

No.	Product name	QTY	Catalog No
1	Pt Screw port	1	216450

※This stop valve has no nozzle and at can be connected to stainless pipe with RC3/8 screws.

3. Insulation hose set

No.	Product name	Bore diameter	QTY	Catalog No
1	Insulation hose set 1m	9.0mm	1	112690
2	Insulation hose set 2m	9.0mm	1	112700
3	Insulation hose set 5m	9.0mm	1	174420

※Material of connecting part is chloroprene rubber. Use the solution that does not immerse into the material.
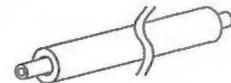
Insulation hose is consumable product. As the progress of deterioration differs depending on the use condition, please check the hose regularly and replace it if it's required.

4. Stainless lid

No.	Product name	Spec.	QTY	Catalog No
1	Stainless lid	SUS304	1	222910

The lid is required when using highly-volatile solution such as methanol. Supplied bath cover is made of plastic and not supportable when using such as highly-volatile solution as a circulation liquid.
※Material is SUS304.
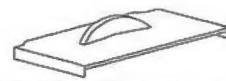
If you leave inflammable or combustible solution (methanol and etc.) out in a place where the temperature is higher (or lower)than room temperature, it may evaporate and cause explosion. Use extreme care when suing these solutions and ventilate the site well.

5. Carriage

No.	Product name	QTY	Catalog No
1	Carriage (with stopper for 4 wheels)	1	222920
2	Caster holder	4	

①   ②
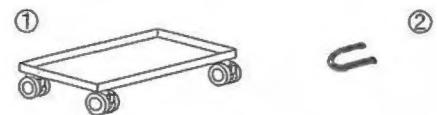
6. Clamp for fixing the product

No.	Product name	QTY	Catalog No
1	Clamp for fixing the main unit	1	222930
2	Clamp for belt	1	
3	Belt for fixing the product	1	
4	PC ring	1	

①   ②   ③
④
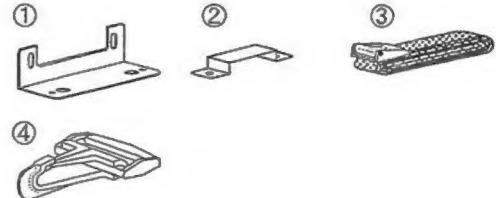
※Two-sided tape is attached to both clamps. Screw and anchor bolt is not supplied with these parts.

3 | Functions and names of operating portion

3-1 Control panel

⑫Pump LED   ⑩Alarm LED

EYELA

Alarm PV   ⒉Indicator
Pump   ③Setting LED
Refrigerator   ④Temperature LED
⑤ Up key
⑥Run/Stop key
⑦Down key
⑧Set / clear key

①Power switch   ⑪Refrigeration unit LED   ⑨Pump key

No.	Name	Functions
①	Power switch	Turns on and off the power.
②	Indicator	Displays measured, setting temperature, alarm and characters.
③	Setting LED	Lights up while displaying setting value (temperature and character) on indicator.
④	Temperature LED	Lights up while displaying temperature. Unit gets controlled while this LED blinks.
⑤	Up key	Value : Each time you press the key, the value increases by 1. 　　　Pressing and holding the key can increase the value continuously. Character : Each time you press the key, the character changes.
⑥	Run／Stop key	Starts and stops control.
⑦	Down key	Value : Each time you press the key, the value decreases by 1. 　　　Pressing and holding the key can decrease the value continuously. Character : Each time you press the key, the character changes.
⑧	Set／Clear key	Switches measured and setting temperature and determines the setting temperature. Clears alarm display when the alarm is activated. Holding down the key for longer than 5 sec. can switch from temperature display to user adjustment mode. In user adjustment mode, each time you press the key (less than 5 sec.), the key switches from setting items to setting value.
⑨	Pump key	Runs and stops pump.
⑩	Alarm LED	Lights up when refrigeration unit or sensor is in abnormal condition, or upper or lower temperature limit alarm is activated.
⑪	Refrigeration unit LED	Lights up when refrigeration unit is turned on.
⑫	Pump LED	Lights up when pump is controlled.

3-3 Safety · alarm features

This product is equipped with the following safety features and alarm features.

If you face any trouble, please refer to "Troubleshooting" on page 29 and follow the instruction.

Safety features

Safety device	Operations	Reasons why the device works.
Fuse	Due to abnormal current flow, fuse blows and cuts off the power source.	· Power supply circuit is short-circuited or excess current flows.
Over load relay for refrigeration unit	Refrigeration unit runs over load (over heat) operation, which makes alarm lamp light up and 「oVL」 will be displayed on indicator to stop refrigeration unit and pump.	Refrigeration unit runs over load (over heat) operation (start-up). · Power and voltage variation exceeds the rated value (±10%) .
Impedance protector for circulation pump (Available only for	Controls electric flow of pump while circulation pump runs over heat operation, and also controls temperature rise to prevent the burning of pump.	Constraint operation because of over load of circulation pump · Viscosity of circulation liquid is high. · Foreign substances are sucked in. · Ambient temperature exceeds 40℃. · Pipe resistance is too strong (Valve is too tightened and etc.)
Self-diagnosis function for control basal plate (Watch dog)	Control basal plate is in abnormal condition, which stops control.	· Ambient temperature exceeds 40℃. · Influence of noise and etc.

Alarm functions

Alarm name	Alarm display and operations	Reasons why alarm is activated.
Temperature sensor alarm	· Buzzer beeps for 15 sec. · All the controls (for refrigeration unit and circulation pump output) gets stopped. · [Alarm] LED lights up. · Alarm description will be displayed on indicator.	Operations · Temperature sensor is disconnected. Releasing alarm · Alarm can be released when turning the power switch on again.

Alarm name	Alarm display and operations	Reasons why alarm is activated.
Power failure alarm	• Control gets stopped or will be continued by power recovery setting. • [Alarm] LED lights up. • Alarm description will be displayed on indicator. Displays alternately	Operation conditions • Power failure occurred during control (while outputting refrigeration unit) Or voltage is dipped. • Power switch was turned off without stopping refrigeration unit. ※Power failure alarm is not activated while only circulation pump is turned on. However, circulation pump stops or continues to work by following the power recovery setting. • In case of power failure alarm setting is 「8888」、power failure alarm does not work. • Power failure alarm setting is changeable. (Refer to P.28)「How to set power failure alarm」 Releasing alarm • Alarm can be released by 「Set」 key.
Watch dog	• All the controls (refrigeration unit • circulation pump output) get stopped. • Indicator turns off a light.	Operation conditions • Due to noise and ambient temperature etc., control basal plate is in abnormal status and can not recover. Releasing alarm • Alarm can be released when turning the power switch on again. Or set the ambient temperature lower than 40℃.
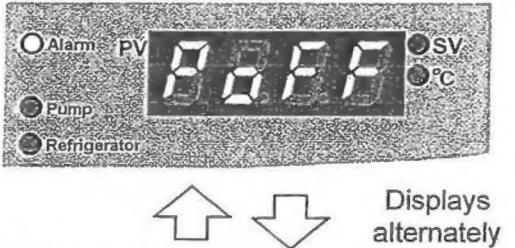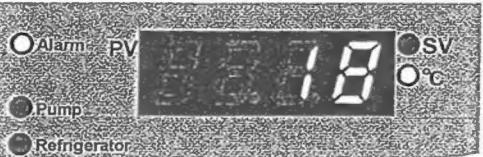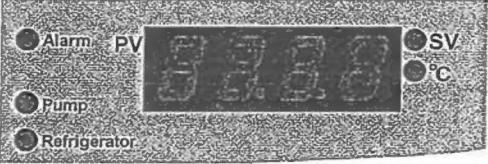
Changing the direction of sticking out drain hose

<table>
<tr><td colspan="2">

⚠ **Caution**

Move and install the unit before filling cool water.

In case that cool water has been already filled into the bath, drain the water before installing the unit.

</td></tr>
</table>

⚠ **Caution**

Disconnect power plug

Before changing the direction of sticking out the drain hose, turn off the power switch, residual current device and disconnect power plug to avoid electric shock or damage for the product.

Direction of drain hose can be changed depending on the condition of your installation site.
※**Default setting of the direction is left side.**

1. Removing side cover
   · Take the hose out and make sure that no cool water is filled before removing drain plug.
   · Remove the screws from side covers (both sides) and lower and slide the cover to remove.
   · Take the hose out from side cover (with drain).

2. Changing the position of the hose
      Take the hose out from other direction.
      ※Use extreme caution when getting the hose through the other side, so that the pipes and parts won't be damaged.

3. Setting the hose and side cover
   · Get the hose through side cover (with drain) and put the drain plug on.
   · Attach the side cover (for both sides) as shown in right illustration.
   · Insert two screws (for both sides) to fix the side cover.
      ※Make sure that no wire or pipe or part is sucked in.
      ※Make sure that drain hose does not touch the fan.

⚠ **Caution**

Handle the hose when the unit is cooled down.

Since refrigeration unit and pipes are in hot temperature, do not handle the hose right after the unit stops running.

※When changing the direction from left side to right side, do not push the hose into the unit, which may cause leak or other trouble.

Removing side cover

Slide the cover to the front

Remove drain plug and take the hose out

Remove two screws

Slide the cover to the front

Direction of drain hose

Left side   Right side

Front
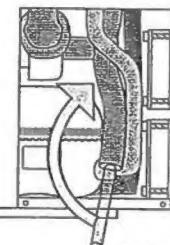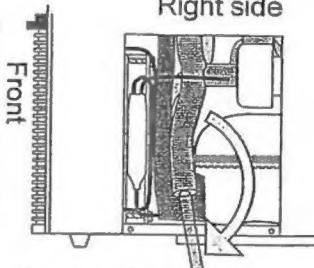
Sticking the drain hose out from other side

Setting drain hose and side cover

Push the cover onto the unit

Get the hose through the port of side cover and put the drain plug on.

Attach the bottom of the cover to these points

Insert two screws to fix the cover

5 | Operation

5-1 Preparation

⚠ Warning

Use extreme caution when using combustible or inflammable solvent.

If you leave combustible or inflammable solvent (methanol and etc.) out at room temperature or higher (lower for some solvent) , it may evaporate and catch fire with some ignition source, and cause explosion. Ventilate the space well while using these solvent.

⚠ Caution

Use the hose at appropriate length.

Use the hose at appropriate length.
When the piping resistance is strong,
cooling capability or temperature distribution
in the circulation bath will be worsen
because of small quantity of circulation water.

⚠ Caution

Use circulation liquid that does affect the material of circulation route inside the unit.

Materials used for the circulation route are copper, stainless, brass, fluorine resin, polyacetal, silicon rubber, polyphenylene ether, ethylene propylene rubber. Use circulation liquid that does not affect these materials. Or some parts in the circulation route may be damaged. Also, do not use extra-pure water or ion exchange water. These water may solve carbon dioxide in the air and generate acid solvent, which may corrode the metal of circulation route.

### ⚠ Caution

Do not conduct closed operation or idling of circulation pump.

These operation may cause malfunction.

---

1 Connecting pipes and hose
   1) Loosen nut for fixing nozzle and make sure that o ring is fixed at the slot for fixing o ring.
   2) With holding nozzle with your hands, tighten the nut so that the water won't be leaked.
   3) Connect hose (Diameter: 9mm) to external circulation nozzle (IN & OUT) and the device to be cooled down. Attach hose band to fix the hose (hose and hose band are not supplied with the product).

   ※ Do not jack up the nozzle too much.
   ※ Do not change the direction of nozzle during operation to prevent damage or leak.
   ※ Material of the hose must have appropriate pressure and fever-resistance and it must not be affected by any solvent. Also, make sure that hose is not bended or crashed when using the unit.
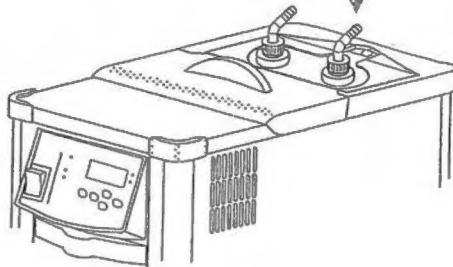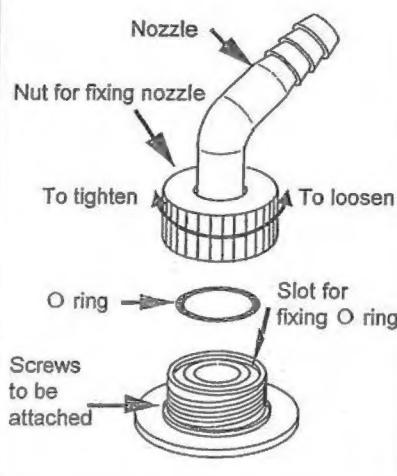
5-2 How to operate the unit

Turn on residual power switch.
In about 5 seconds after displaying initial display, measured temperature of cool water circulating bath will be displayed (measuring mode)
※On 「*8888*」, the specific value or alphabet will be displayed.

1.Setting temperature
   Setting temperature can be changed regardless of the status of the unit.

   1) Setting temperature (setting mode)
      Press [Set/Clear] key. Indicator changes to display setting temperature (blinking) and you can set the temperature.

      • 「Setting LED (SV)」 lights up.

   ※Setting temperature is the value you used previous time. Factory default is 「20℃」.

   2) Changing setting temperature
      Press [▲] or [▼] key to input setting temperature
   ※ Each time you press [▲] or [▼] key, the temperature changes by 1℃ and holding down the key for longer than 3 sec. can change the value by 10℃.

   3) Determining setting temperature
      Press [Set/Clear] key. Displayed setting temperature (blinking) is determined and indicator changes to display measured temperature (measuring mode).

      • 「Setting LED (SV)」 turns off a light.

   ※If no key operation is done for longer than a minute, changed preset temperature can not be determined and indicator changes to display measured temperature (measuring mode). In such a case, please reset from 1).

   ※Status of LED
   「●」、「*8888*」 Turns off a light
      「○」、「*8888*」 Lights up
   ☀、*8888* Blinks

Initial screen

After approx. 5 sec.

2) Changing setting temperature

Press

Press
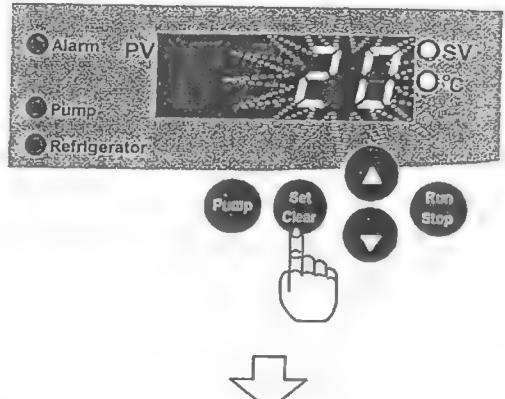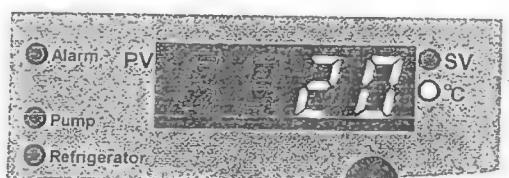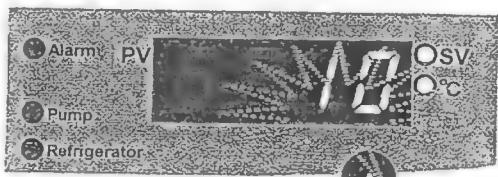
5-3 How to use optional accessories

5-3-1. How to use stop valve

1. Attaching stop valve
   1) Loosen the nut for fixing external circulation nozzle and remove it from the main unit. Make sure that o ring is fixed at the slot for fixing o-ring

   (1) Prepare stop valve, which is optional accessory, and with holding rotating valve part, tighten the nut to prevent leak.
   (2) After tightening the nut, valve can be rolled 360℃.
   (3) Connect hose (diameter: 9mm) to the nozzle of stop valve and to the device that is to be cooled down.
   (4) Fix the hose with hose band (hose and hose band are not supplied with the product).

   ※Do not jack up the nozzle too much.
   ※Material of the hose must have appropriate pressure and fever-resistance and it must not be affected by any solutions. Also, make sure that hose is not bended or crashed when using the unit.

   2) Make sure that drainage pug is attached and fill the water into the bath (Approx.3L).

   ※Use antifreeze if you use the unit at +7℃ or lower. However, if you use ethylene glycol or nibrine, the viscosity will be higher in low temperature, which makes temperature distribution in the bath worse.
   In such a case, mix the moderate amount of water (Make sure the freezing temperature when the liquid is concentrated.)

   3) Make sure that stop valve is closed.
   ※Cooling capability will be worsened when the cooling coil is exposed during operation.

2. How to operate
   1) Turn residual current device, power switch and pump key.

   2) Pump LED lights up and pump starts working. Open the stop valve gradually to start external circulation. Make sure that connecting part of hose and nozzle have no leak.
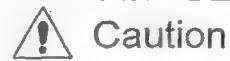

⚠ Caution

## Use the hose at appropriate length.

Use the hose at appropriate length.
When the piping resistance is strong, cooling capability or temperature distribution in the circulation bath will be worsen because of small quantity of circulation water.

Attaching stop valve
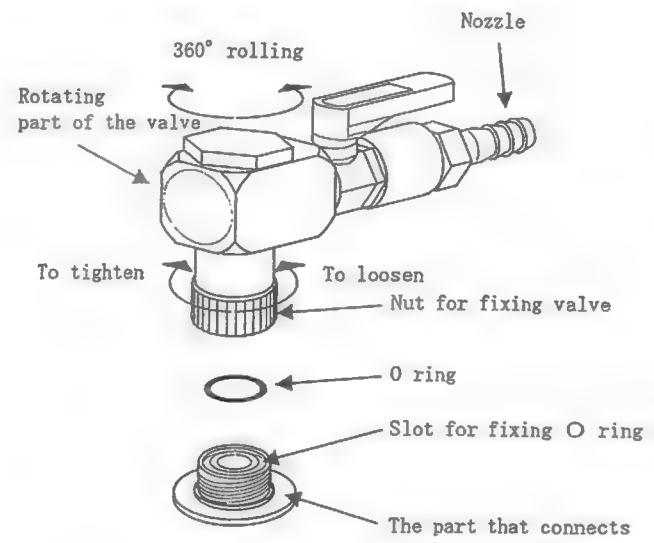
※You can remove nozzle and connect stainless pipe to RC3/8 screw.

Status of stop valve
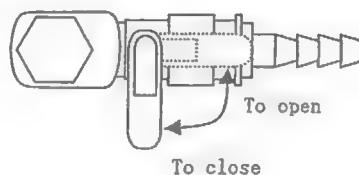
5-3-4. Carriage

By setting carriage, can be moved and installed
smoothly on the floor.
1. Position of the carriage
   1) Lower the stop lever (for 4 wheels) to lock the
      caster so that carriage won't move.

   2) Set the 4 rubber supporters on the carriage.
   ※Since the weight of the main unit is about
      30kg, handle it with two persons.
   ※Since there's no space between carriage and
   main unit, use caution not to jam your fingers.

2. Carrying and installing the unit
   1) Raise the 4 stop levers to unlock and move it
      to the installation site.
   ※Moving the unit on bumpy place will damage
      the casters. In such a case, carry the unit.

   2) At installation site, lower the stop levers of
      casters to lock.

   3) Insert supplied 4 caster holders into the caster
      to fix.

Setting carriage
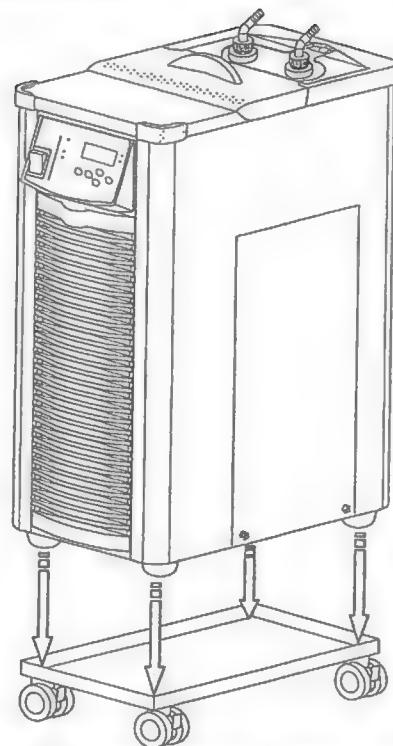
Set the rubber supporters (4 points) of the main
unit on the carriage as shown above.

Front

Carriage

**Use caution not to
jam your finger.**
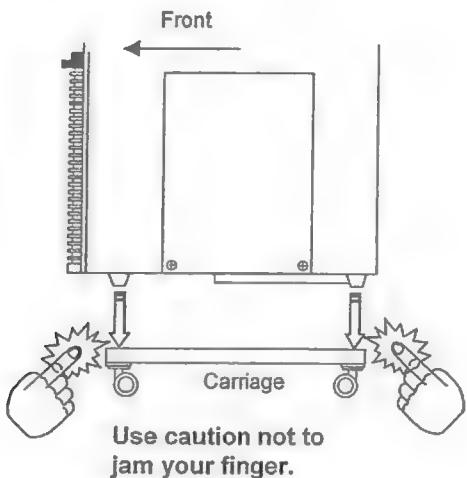
Locking and unlocking the caster

Stop lever

To unlock

Caster

To lock

Caster holder
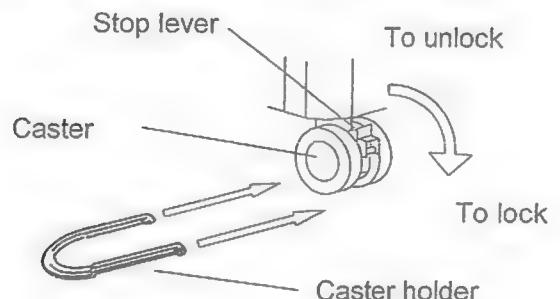
3. How to use PC ring for fixing belt

If the wall or laboratory table has hook or handle, supplied PC ring enables to lock or unlock the main unit easily.

※Even when using carriage, main unit can be locked or unlocked.

※Hook and handle are not supplied with the product. Please purchase them at the store closer to you.

1) Get the belt through PC ring and wind the belt around the main unit.

   ※Check the direction of PC ring.
   ※Wind the belt tightly.
   ※When using carriage, wind the belt around the carriage as well. In this case, get the belt through the back of the casters (front wheels).
   ※When not using carriage, get the belt through the back of rubber supporters (front).

2) Hook the PC ring to the hook or handle on the wall.

Attaching PC ring

Get fixing belt through PC ring
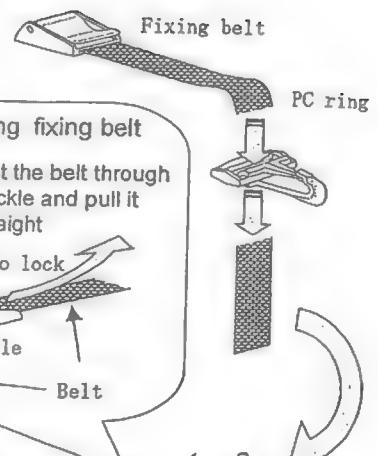
Fixing belt

PC ring

Locking and unlocking fixing belt

Get the belt through buckle and pull it straight

Lock bar

To unlock

To lock

Buckle
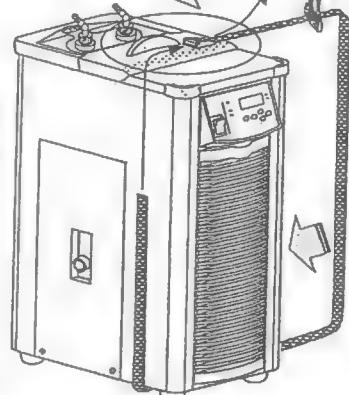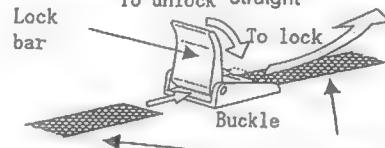
Belt

Get the belt through PC ring and wind it round the main unit tightly and fix it.

Locking and unlocking PC ring

Hook

Handle

Press tab to lock and unlock
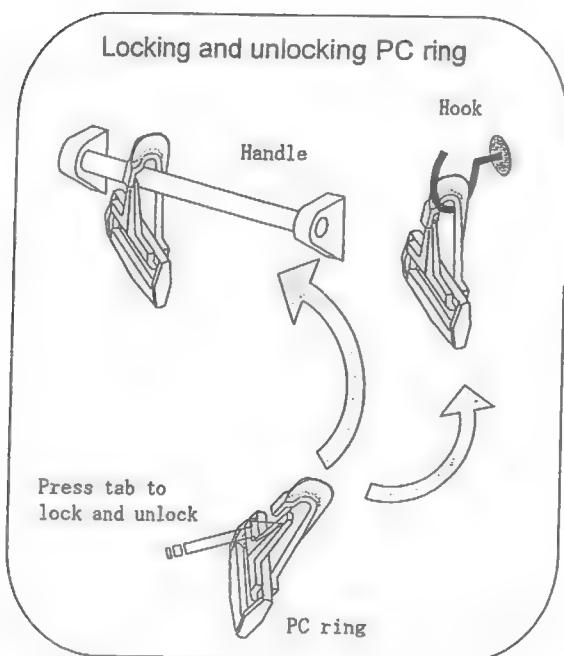
PC ring

Laboratory table
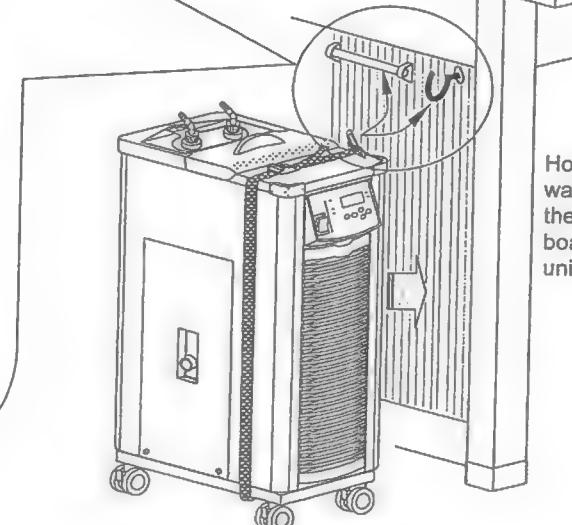
Hook PC ring to the wall or to the hook on the side of laboratory board to fix the main unit.

2. How to operate upper temperature limit alarm

Detecting temperature for upper temperature limit alarm can be changed.
* If you set the temperature lower than 10℃, upper temperature limit alarm tends to be activated.
  So do not set the value lower than 10℃.

Setting upper temperature limit alarm
1) Press [Set] key for longer than 5 seconds.
   The mode changes to adjustment mode and indicator shows 「5850」. Then, the mode changes to calibrating displayed temperature mode.
   · 「Setting LED（SV）」turns off a light.

2) Setting upper temperature limit alarm
   Press [▲] key to enter into upper temperature limit alarm [8888].

3) Moving to upper temperature limit alarm
   Press [set] key. Indicator changes to display preset temperature (blinking) for upper temperature limit alarm.
   ※Preset temperature (blinking) is the value that was input previous time. Factory default value is 10℃.

4) Changing setting value for the alarm
   Press [▲] and [▼] key to input setting temperature.
   Each time you press [▲] or [▼] key, the temperature changes by 1℃. Pressing and holding down the key can change the value continuously.

5) Determining the setting value for the alarm（moves to lower temperature limit alarm）
   Press [Set] key. Displayed temperature (blinking) is determined and indicator shows [8888].
   Then, the mode changes to lower temperature limit alarm mode.

※ Calibrated temperature will not be available until you press [Set] key.
※ To change another adjustment mode, press [▲] or [▼] key to change the mode.
※ If you do not change other adjustment mode, press [Set] key for longer than 5 seconds. Indicator changes to display measured temperature again.
※ If no key operation is done for longer than a minute while setting, the display changes to measured temperature display (measuring mode) again.
 In such a case, please reset all the settings from 1).

1) Moves to adjustment mode

Press longer than 5 sec.

2) Setting upper temperature limit alarm

Press once
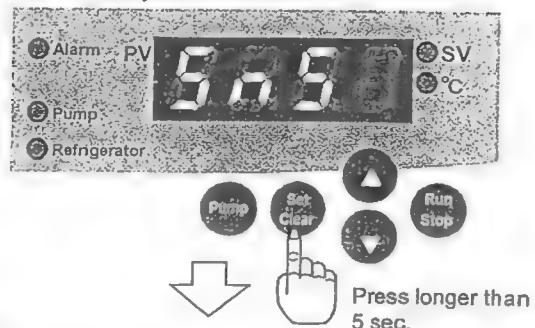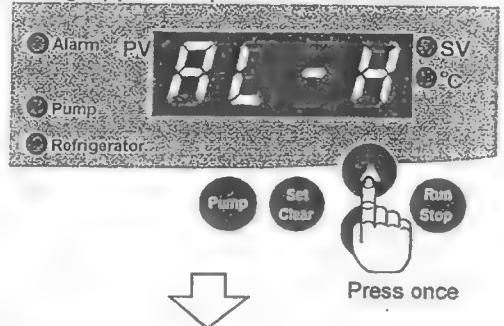
3) Moves to upper temperature limit alarm

Press
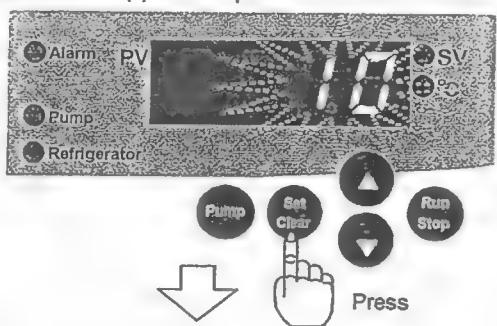
4) Changing the setting value for upper temperature limit alarm

Press
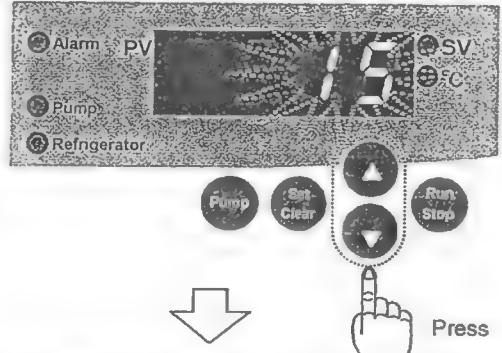
5) Determining upper temperature limit alarm
   （Moves to lower tem. Limit alarm)

Press
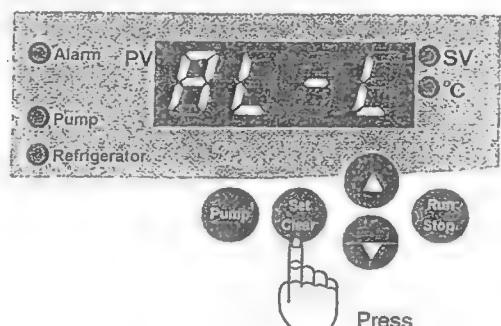
4. How to operate power failure recovery setting

You can set the setting after the recovery of power failure.
(Power failure includes the case that power switch is turned off without stopping control.)

Power recovery setting
1) Moves to adjustment mode
   Press [Set] key for longer than 5 sec.
   The mode enters into adjustment mode and indicator displays 「*SASd*」.
   Then, the mode changes to calibrating displayed temperature .
   ・「Setting LED (SV) 」turns off a light.

2) Power recovery setting
   Press [▲] key three times (or press [▼] key once) to display power recovery setting 「*PrEE*」

3) Moves to power recovery setting
   Press [Set] key.
   Indicator changes to display the preset character (blinking) for power recovery setting.
   ※Preset character (blinking) is the one that was set previous time. Factory default setting is 「*Cont*」.

4) Changing preset character for power recovery setting
   Press [▲] or [▼] key to select setting character.
   ※Setting character changes in order as below;
   「*Cont*」 : Continues to control
   「*StoP*」 : Stopping control

5) Determining power recovery setting (moves to power failure alarm setting)
   Press [Set] key. Displayed setting character (blinking) is determined and indicator displays 「*PoFF*」 to change to power failure alarm setting.

※ Changed character will not be available until you press [Set] key.
※ To change another adjustment mode, press [▲] or [▼] key to change the mode.
※ If you do not change other adjustment mode, press [Set] key for longer than 5 seconds. Indicator changes to display measured temperature again.
※ If no key operation is done for longer than a minute while setting, the display changes to measured temperature (measuring mode) display again. In such a case, please reset all the settings from 1).

1) Moves to adjustment mode
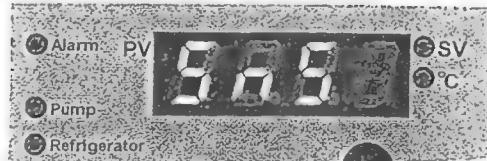
Press longer than 5 sec.

2) Setting power failure recovery setting


Press 3 times

3) Moves to power failure recovery setting
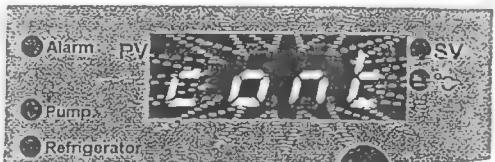
Press

4) Changing the setting character for power recovery
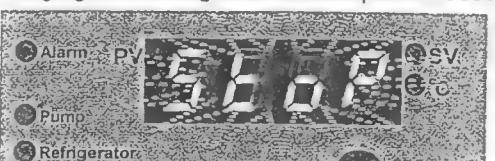
Press

5) Determining power recovery setting
(Moves to power failure alarm setting)
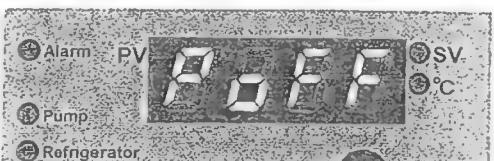
Press

6 | Troubleshooting

Trouble	Cause of trouble	Countermeasures
No display is shown when turning on power switch.	Power plug is disconnected to outlet, or not connected to outlet completely.	Turn off residual current device and power switch, and connect power plug to outlet.
	Power source is not supplied.	Turn on the breaker on distribution board.
	Fuse has blown. (Excess current flows.)	Replace with new fuse. If that failure mode still remains after replacing the fuse, stop running the product immediately and contact your local dealer or closest customer service center.
	Power switch is impaired.	Stop running the product immediately and contact your local dealer or closest customer service center.
	Temperature controller is impaired.	
Refrigeration unit does not work.	Refrigeration unit is impaired.	
	SSR is impaired.	
	Water level lowers and cooling coil is exposed, which causes over load operation.	Refill the cool water. (Refer to「3.Filling cool water」on page 16.)
	Protective timer for refrigeration unit works.	After passing the time, make sure that refrigeration unit works.
The unit is not cooled down.	Refrigeration unit does not work.	Stop running the product immediately and contact your local dealer or closest customer service center.
	Fan of refrigeration unit does not work.	
	Gas leaks.	
The unit is cooled down poorly.	Gas leaks.	
	Fan for refrigeration unit does not work.	
	Ambient temperature is higher than 35℃.	Set the temperature lower than 35℃.
	Heat load is too heavy.	Reduce the load to the value that is within specified range.
	Obstacle closer to the main units prevents emission and exhaust heat.	Set enough space around the unit. (Refer to「4-2. Condition 」on page 12.
Cool water does not circulate.	Strainer in the cool water circulation bath has some dust.	Remove the dust.
	Air is sucked in.	Remove drainage plug and make sure that cool water flows from drainage port, and put drainage plug again. Turn on and off the circulation pump for 2-3- times repeatedly to release the air. (Refer to「2. Starting operation」on page 18.
	Stop valve is closed. (In case that any option is attached.)	Open the valve. (In case that any option is attached.)
Circulation volume is small.	Hose is crushed.	Fix the hose.
	Pressure loss of circulation system is too big.	Reduce pressure loss.
	External circulating point is too high.	Adjust the position.
Bath is frozen at 7℃ or higher (setting temperature).	Due to pressure loss of pipe, circulation volume is small and bath can not be stirred sufficiently.	Open stop valve. Use antifreeze.
	Temperature controller is impaired or refrigeration unit does not stop.	Stop running the product immediately and contact your local dealer or closest customer service center.

7 | Maintenance · checkup

7-1　Replacing fuse

⚠ ·When replacing fuse the product, turn off the power switch and residual disconnect mains connector.
· Use only the fuse of a regulated value.

1) Turn off the power switch and disconnect power cord from inlet with fuse.

2) Take the fuse holder out by flat-blade screwdriver.

3) Replace 2 fuses with new ones.

4) After replacing fuses, insert fuse holder.

※If the fuse blows after replacing with new one, stop using the product and call the local dealer.

Draw this part

Inlet with fuse

Fuse holder

Slow blow
Fuse T6.3A

Fuse holder
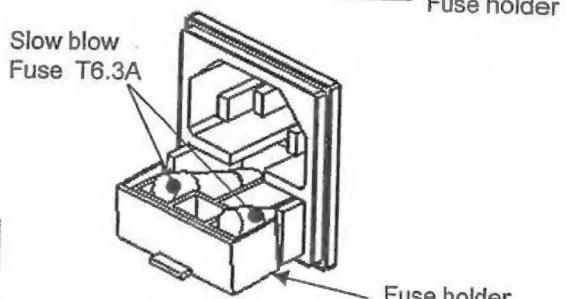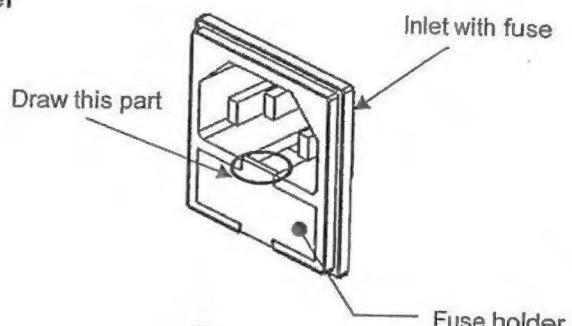
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Fuse can be used

Cartridge fuses
5×20mm Slo-Blo T6.3A 250V  (Surge withstand )
Ex.  Manufacturer : Little fuse    021306.3XP
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7-2　Cleaning and caring the product

⚠ Warning	⚠ Caution
Do not disassemble the unit. Some parts in the unit are under electric pressure and high pressure. So disassembling the unit may cause electric shock or cause users physical injury.	**Do not touch cooling fin with bare hands.** Do not touch cooling fin with bare hands when conducting maintenance work. Edgy fin may cut your hands.
⚠ Caution	⚠ Caution
Use appropriate product for cleaning and caring the product in proper way. When cleaning and caring the product, do not pour water directly on the external and internal part of the unit, and also do not use cleanser, thinner, petrol, lamp oil, acid and related products. These products may cause Electric shock or damage the unit.	**Disconnect mains connector when cleaning and caring the product.** When cleaning and caring the product, turn off the power switch and residual disconnect mains connector from outlet for preventing electric shock hazard or damage on the product.

※The unit is coated with ABS (control panel), polyphenylene ether (bath cover), polyacetal (nozzle and drain plug) and nitrile rubber (tray). (These are nonferrous materials). Compared to metals, these plastics and rubbers can be easily discolored, deformed and damaged by heat, light (example: direct sun), solution (example: circulation liquid, cleanser) and forces (impact). So use caution when handling the unit.